

Amendment and Response

Serial No.: 10/008,392

Confirmation No.: 3013

Filed: November 13, 2001

For: SYSTEM AND METHOD USING THERMAL IMAGE ANALYSIS FOR POLYGRAPHII TESTING

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Remarks

The Office Action mailed November 14, 2002 has been received and reviewed. Claims 1, 3, 9-10, 12, 14, 20, 22-24, 30-31, and 36-37 have been amended. Therefore, claims 1-40 are pending in the present application. Reconsideration and withdrawal of the rejections are respectfully requested in view of the above amendments and the following remarks.

Information Disclosure Statement

The Examiner failed to consider two documents provided on the Form 1449 entitled "The Master of Disguise" and "Remote Sensing, Principles and Interpretation" indicating that the relevant pages relating to the present application were not set forth. Such documents were submitted for background art. If the Examiner, after review of the Table of Contents for such references, would like to review any particular pages, please request such pages and we will provide them to you.

The 35 U.S.C. §102 Rejection

The Examiner rejected claims 1, 2, 4-10, 12-13, 15-21, 23, 25-28, 30, 32-36 and 38-40 under 35 U.S.C. §102(b) as being anticipated by Anbar (U.S. Patent 5,771,261). The Examiner alleges that all of the elements of these claims are disclosed in Anbar.

Applicant respectfully traverses the rejection. However, to move the application to issuance, Applicant has amended the claims to make it clear that blood flow rate data includes change of blood flow rate. As such, each of the independent claims 1, 12, 23, 30, and 36 includes a limitation that thermal image data is transformed into at least change of blood flow rate or includes apparatus for performing such a transformation. For example, claim 1 includes "determining change of blood flow rate;" claim 12 includes "a computing apparatus operable upon the thermal image data to transform the thermal image data to blood flow rate data . . . wherein the blood flow rate data comprises change of blood flow rate;" and so forth.

For a claim to be anticipated under 35 U.S.C. § 102(b), each and every element of the

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claim must be found in a single prior art reference. *See* M.P.E.P. § 2131.

Anbar does not describe the limitations of the amended independent claims 1, 12, 23, 30, and 36. Applicant believes that Anbar does not describe transformation of thermal image data to blood flow rate data as indicated in many of the original independent claims. However, Applicant has clarified the claims to indicate that the blood flow rate data includes change of blood flow rate. It is even more clear that Anbar does not describe transformation of thermal image data to change of blood flow rate.

Anbar uses a thermal imaging system. However, Anbar does not transform thermal image data to blood flow rate data that includes change of blood flow rate. Anbar simply determines a thermal quantity referred to as "HST." HST is defined as the average temperature divided by the standard deviation of the average temperature; a dimensionless parameter. In Anbar, it is indicated that "to a much lesser extent" HST is affected "by the blood flow in subcutaneous vessels." In other words, Anbar assumes that the quantity HST is correlated indirectly with blood perfusion. However, there is no transformation of thermal image data to blood flow rate data that includes change of blood flow rate as described in the pending claims (e.g., a heat transfer equation that allows one to compute blood flow rate values out of thermal values). Anbar does not compute blood flow rate values, but rather Anbar uses derivative thermal values (i.e., HST) that are assumed to be, at least in part, the result of quantitatively unspecified blood flow changes.

For at least the above reasons, Anbar does not anticipate independent claims 1, 12, 23, 30, and 36. Further, the remainder of the rejected claims (i.e., claims 2, 4-10, 13, 15-21, 25-28, 32-35, and 38-40) respectively depend on one of the independent claims, either directly or indirectly. Therefore, they include the limitations of the respective independent claim upon which they depend. As such, these claims are also not anticipated by Anbar for the same reasons as provided above.

The 35 U.S.C. §103 Rejection

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The Examiner rejected claims 11, 22, and 29 under 35 U.S.C. §103(a) as being unpatentable over Anbar in view of Barnett et al. (U.S. Patent 2,944,542). Applicant respectfully traverses such rejections.

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally the prior art references must teach or suggest all the claim limitations. See M.P.E.P. § 2143.

The rejected claims 11, 22, and 29 respectively depend on one of the independent claims, either directly or indirectly. Therefore, they include the limitations of the respective independent claim upon which they depend. As such, for the same reasons provided above with respect to the independent claims, Anbar does not describe, teach or suggest all the claim limitations of such dependent claims. Further, Barnett et al. does nothing to provide the lacking elements.

For the above reasons, the rejected claims 11, 22, and 29 are not obvious in view of the cited references.

Allowable Subject Matter

Applicants further acknowledge that claims 3, 14, 24, 31, and 37 are objected to as being dependent upon a non-elected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. However, Applicants at this time have not rewritten such claims in independent form as it is believed that that such claims are dependent from claims that are in allowable form.

Summary

It is respectfully submitted that the pending claims are in condition for allowance and

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notification to that effect is respectfully requested. The Examiner is invited to contact Applicant's Representatives, at the below-listed telephone number, if it is believed that prosecution of this application may be assisted thereby.

FAX RECEIVED

Respectfully submitted for

MAR 13 2003

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13 March 2003**CERTIFICATE UNDER 37 CFR §1.8:**

The undersigned hereby certifies that this paper is being transmitted by facsimile in accordance with 37 CFR §1.6(d) to the Patent and Trademark Office, addressed to Assistant Commissioner for Patents, Washington, D.C. 20231, on this 13 day of MARCH, 2003, at 4:05pm (Central Time).

By:

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**APPENDIX A - CLAIM AMENDMENTS
INCLUDING NOTATIONS TO INDICATE CHANGES MADE**

Serial No.: 10/008,392

Docket No.: H0002443-01 (M&R 115.00200101)

Amendments to the following are indicated by underlining what has been added and bracketing what has been deleted.

In the Claims

For convenience, all pending claims are shown below.

1. (Once Amended) A method for use in detecting deception of a person, the method comprising:
 - providing thermal image data of at least a region of a face of a person; and
 - transforming the thermal image data to blood flow rate data for use in determining whether the person is deceptive or non-deceptive, wherein transforming the thermal image data comprises determining change of blood flow rate.
2. The method of claim 1, wherein determining whether the person is deceptive or non-deceptive comprises classifying the person as deceptive or non-deceptive based on a change of blood flow rate over time in the at least one region of the face.
3. (Once Amended) The method of claim 1, wherein transforming the thermal image data comprises transforming the thermal image data using a thermodynamic model where change of blood flow rate is inversely proportional to the square of skin temperature deviation from a core temperature of a human body.
4. The method of claim 1, wherein providing the thermal image data comprises providing thermal image data of at least a region proximate an eye of the person.
5. The method of claim 1, wherein providing the thermal image data comprises providing thermal image data of more than one region of the face of the person.

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6. The method of claim 1, wherein providing thermal image data comprises:
asking the person a question to elicit a response therefrom;
focusing a thermal infrared image device operable to provide thermal image data on at least the region of the face of the person; and
capturing thermal image data during at least a period of time during at least the response from the person.
7. The method of claim 6, wherein determining whether the person is deceptive or non-deceptive based on the blood flow rate data comprises determining whether the person is being deceptive or non-deceptive with respect to the response to the question.
8. The method of claim 1, wherein providing thermal image data comprises:
focusing a thermal infrared image device operable to provide thermal image data on at least the region of the face of the person;
capturing frames of thermal image data during at least a period of time; and
tracking movement of at least the region of the face of the person.
9. (Once Amended) The method of claim 1, wherein the method further comprises providing measurement of one or more physiological parameters different than change of blood flow rate obtained using thermal image data, and further wherein determining whether the person is deceptive or non-deceptive comprises determining whether the person is deceptive or non-deceptive based on change of blood flow rate obtained using thermal image data and the one or more physiological parameters.
10. (Once amended) The method of claim 9, wherein determining whether the person is deceptive or non-deceptive comprises:
making a preliminary determination of whether the person is deceptive or non-deceptive

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based on the one or more physiological parameters and making preliminary determination based on change of blood flow rate obtained using thermal image data; and
confirming one preliminary determination by comparing it to the other.

11. The method of claim 9, wherein providing measurement of one or more physiological parameters comprises providing measurement of the one or more physiological parameters using at least one invasive technique.

12. (Once Amended) A system for use in detecting deception of a person, the system comprising:

a thermal infrared image device operable to provide thermal image data of at least a region of a face of a person; and

a computing apparatus operable upon the thermal image data to transform the thermal image data to blood flow rate data for use in determining whether the person is deceptive or non-deceptive, wherein the blood flow rate data comprises change of blood flow rate.

13. The system of claim 12, wherein the computing apparatus is further operable to classify the person as deceptive or non-deceptive based on a change of blood flow rate over time in the at least one region of the face.

14. (Once Amended) The system of claim 12, wherein the computing apparatus is further operable to transform the thermal image data using a thermodynamic model where change of blood flow rate is inversely proportional to the square of skin temperature deviation from a core temperature of a human body.

15. The system of claim 12, wherein the thermal infrared image device is operable to provide thermal image data of at least a region proximate an eye of the person.

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16. The system of claim 12, wherein the thermal infrared image device is operable to provide thermal image data of more than one region of the face of the person.

17. The system of claim 12, wherein the thermal infrared image device is operable to capture thermal image data during at least a period of time during at least an elicited response from the person.

18. The system of claim 17, wherein the computing apparatus is operable to determine whether the person is deceptive or non-deceptive based on the blood flow rate data corresponding to the thermal image data captured during at least the elicited response.

19. The system of claim 12, wherein the thermal infrared image device is operable to capture frames of thermal image data during at least a period of time, and further wherein the computing apparatus is further operable to track movement of at least the region of the face of the person during the period of time.

20. (Once Amended) The system of claim 12, wherein the system further comprises means for providing measurement of one or more physiological parameters different than change of blood flow rate obtained using thermal image data, and further wherein the computing apparatus is operable to determine whether the person is deceptive or non-deceptive based on the blood flow rate data obtained using thermal image data and the one or more physiological parameters.

21. The system of claim 20, wherein the computing apparatus is further operable to make a preliminary determination of whether the person is deceptive or non-deceptive based on the one or more physiological parameters and to make a preliminary determination of whether the person is deceptive or non-deceptive based on the blood flow rate data obtained using thermal image

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data, and thereafter, the computing apparatus is operable to confirm one preliminary determination by comparison to the other.

22. (Once Amended) The system of method of claim 20, wherein the means for providing measurement of one or more physiological parameters different than change of blood flow rate obtained using thermal image data comprises one or more invasive means for providing invasive measurement of one or more physiological parameters different than change of blood flow rate.

23. (Once Amended) A polygraph method for use in determining whether a person is being deceptive or non-deceptive with respect to a response elicited from the person, the method comprising:

capturing thermal image data from at least one region of the face of the person during at least the elicited response;

transforming the thermal image data to blood flow rate data [representative of a] wherein blood flow rate data comprises change of blood flow rate over time in the at least one region of the face; and

classifying the person as deceptive or non-deceptive with respect to the elicited response based on the blood flow rate data.

24. (Once Amended) The method of claim 23, wherein transforming the thermal image data comprises transforming the thermal image data using a thermodynamic model where change of blood flow rate is inversely proportional to the square of skin temperature deviation from a core temperature of a human body.

25. The method of claim 23, wherein capturing the thermal image data comprises capturing thermal image data of at least a region proximate an eye of the person.

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26. The method of claim 23, wherein capturing the thermal image data comprises capturing thermal image data of more than one region of the face of the person.

27. The method of claim 23, wherein the method further comprises tracking movement of at least the region of the face of the person during the capturing of the thermal image data.

28. The method of claim 23, wherein the method further comprises providing measurement of one or more physiological parameters different than the change in blood flow rate obtained using thermal image data, and wherein classifying the person as deceptive or non-deceptive comprises determining whether the person is deceptive or non-deceptive based on the change of blood flow rate and the one or more physiological parameters.

29. The method of claim 28, wherein providing measurement of the one or more physiological parameters comprises providing measurement of one or more physiological parameters different than blood flow rate data obtained using thermal image data using at least one invasive method.

30. (Once Amended) A method for use in monitoring blood flow rate, the method comprising:
providing thermal image data of at least a region of a face of a person; and
transforming the thermal image data to blood flow rate information comprising change in blood flow rate.

31. (Once Amended) The method of claim 30, wherein transforming the thermal image data comprises transforming the thermal image data using a thermodynamic model where change of blood flow rate is inversely proportional to the square of skin temperature deviation from a core temperature of a human body.

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32. The method of claim 30, wherein providing the thermal image data comprises providing thermal image data of at least a region proximate an eye of the person.
33. The method of claim 30, wherein providing the thermal image data comprises providing thermal image data of more than one region of the face of the person.
34. The method of claim 30, wherein providing thermal image data comprises:
focusing a thermal infrared image device operable to provide thermal image data on at least the region of the face of the person;
capturing frames of thermal image data during at least a period of time; and
tracking movement of at least the region of the face of the person.
35. The method of claim 30, wherein the method further comprises determining a physiological state of the person based on the blood flow rate information.
36. (Once Amended) A system for use in monitoring blood flow rate, the system comprising:
a thermal infrared image device operable to provide thermal image data of at least a region of a face of a person; and
a computing apparatus operable upon the thermal image data to transform the thermal image data to blood flow rate information comprising change in blood flow rate.
37. (Once Amended) The system of claim 36, wherein the computing apparatus is operable to transform the thermal image data using a thermodynamic model where change of blood flow rate is inversely proportional to the square of skin temperature deviation from a core temperature of a human body.
38. The system of claim 36, wherein the computing apparatus is further operable to determine

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a physiological state of the person based on the blood flow rate information.

39. The system of claim 36, wherein the thermal infrared image device is operable to provide thermal image data of at least a region proximate an eye of the person.

40. The system of claim 36, wherein the thermal infrared image device is operable to capture frames of thermal image data during at least a period of time, and further wherein the computing apparatus is further operable to track movement of at least the region of the face of the person during the period of time.